Exhibit B

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Attorney Docket No. DE919990056

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s): V. Fischer et al.
Docket No.: DE919990056
Serial No.: 09/638,160
Filing Date: August 14, 2000
Group: 2654
Examiner: Qi Han

> I hereby certify that this paper is being deposited on this date with the U.S. Postal Service as first class mail addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450.
>
> Signature: _V Bencivenni_   Date: December 24, 2003

Title: Method and System for Generating Squeezed Acoustic Models for Specialized Speech Recognizer

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RESPONSE TO OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated August 26, 2003, Applicants submit herewith the following remarks.

Remarks begin on page 2 of this paper.

An **Affidavit Under 37 C.F.R. §1.131** is attached following page 7 of this paper.

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REMARKS

The present application was filed on August 14, 2000 with claims 1-20. Claims 21-23 were added in an Amendment dated April 28, 2003. In the outstanding Office Action dated August 26, 2003, the Examiner has: (i) indicated that Applicants' request for a continued prosecution application filed on May 28, 2003 has been entered; (ii) rejected claims 1-4, 10-13, 19 and 20 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,758,319 to Knittle (hereinafter "Knittle"), in view of "well known art;" (iii) rejected claims 5 and 14 under §103(a) as being unpatentable over Knittle in view of "well known prior art," and further in view of U.S. Patent No. 6,463,413 to Applebaum et al. (hereinafter "Applebaum"); (iv) rejected claims 6, 7, 15-17 and 21-23 under §103(a) as being unpatentable over Knittle in view of "well known prior art" and Applebaum, and further in view of U.S. Patent No. 6,260,013 to Sejnoha (hereinafter "Sejnoha"); (v) rejected claims 8 and 17 under §103(a) as being unpatentable over Knittle in view of "well known prior art," and further in view of Sejnoha; and (vi) rejected claims 9 and 18 under §103(a) as being unpatentable over Knittle in view of "well known prior art" and Sejnoha, and further in view of Applebaum.

In this response, Applicants traverse the §103(a) rejections. Applicants respectfully request reconsideration of the present application in view of the following remarks.

Claims 1-4, 10-13, 19 and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Knittle in view of "well known prior art." Specifically, the Examiner acknowledges that Knittle "fails to expressly to [sic] disclose 'generating from the set of probability density functions of the first speech recognizer, a set of probability density functions of the second speech recognizer by selecting a subset of probability density functions of the first speech recognizer being distinctive of the particular application, such that the second speech recognizer is at least one of tailored to the particular application and requires reduced resources compared to the first speech recognizer'" (present Office Action; page 4, paragraph 1). However, the Examiner takes official notice of the fact that this feature was well known in the art (present Office Action; page 4, paragraph 1). In this regard, the Examiner contends that probability density functions (PDFs) are inherently associated with states of the HMM, "thus when generating and selecting a subset of states, an associated subset

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of pdfs can be also generated and selected for the HMM based recognition system" (present Office Action; page 4, paragraph 1). Applicants respectfully disagree with this contention.

Applicants submit that the Examiner's characterization of Knittle as used against the subject claims appears to be incorrect. Knittle focuses on a runtime limitation in the number of candidate words in the active vocabulary that need to be compared to a given test utterance (Knittle; column 1, lines 6-9), and Knittle discloses a methodology for achieving this objective by means of precomputed word sequence probabilities, which are based on a language model of the recognizer (Knittle; column 2, lines 32-38). While the general objectives of Knittle may be similar to the objectives of the claimed invention, namely, providing a high accuracy, low resource speech recognizer, the techniques for accomplishing this are clearly distinguishable from the claimed invention.

In contrast to Knittle, the present invention relates to reducing a size of the acoustic model itself, i.e., both the number of acoustic subword unit HMMs (states) and the number of elementary pdfs for the output probabilities of these HMMs (present specification; page 7, lines 19-24). In this manner, unlike Knittle, the present invention does not limit the size of the vocabulary during the recognition process and does not require any additional runtime computations. As such, the claimed invention offers a distinct benefit of reducing the resources of the second speech recognizer without requiring additional runtime computation, which cannot be accomplished using the methodologies taught by Knittle.

With regard to independent claims 1, 10 and 19, which are of similar scope, each of these claims requires:

> generating, from the set of states of the first speech recognizer, a set of states of the second speech recognizer by selecting a subset of states of the first speech recognizer being distinctive of a particular application; and generating, from the set of probability density functions of the first speech recognizer, a set of probability density functions of the second speech recognizer by selecting a subset of probability density functions of the first speech recognizer being distinctive of the particular application . . .

Applicants believe that the Examiner incorrectly characterizes Knittle in rejecting the subject claims. For instance, the Examiner erroneously analogizes the "means for determining a subvocabulary of

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active words containing the second plurality of the first plurality of words based on the current mode of the application" disclosed in Knittle (Knittle; column 2, lines 52-55) with the "second speech recognizer" set forth in claim 1 (present Office Action; page 3, paragraph 3). However, the second speech recognizer, as set forth in the subject claims, requires a set of states generated from the first set of states corresponding to the first speech recognizer as well as a set of probability density functions generated from the first set of probability density functions corresponding to the first speech recognizer. Since Knittle fails to teach or suggest such an arrangement, the "means for determining a subvocabulary of active words" taught by Knittle cannot reasonably be analogized to the second speech recognizer recited by the claimed invention.

The Examiner further contends that Knittle discloses "using hidden Markov models (HMM) for state to state transition . . . wherein the HMM inherently includes a set of probability density functions (referenced as pdfs) that associated [sic] with the set of states in the HMM" (present Office Action; page 3, last paragraph). Applicants respectfully disagree with this contention and submit that, while Knittle may disclose HMMs in the general sense, Knittle fails to teach or suggest generating, from the set of states of the first speech recognizer, a set of states of the second speech recognizer by selecting a subset of states of the first speech recognizer being distinctive of a particular application and generating, from the set of probability density functions of the first speech recognizer, a set of probability density functions of the second speech recognizer by selecting a subset of probability density functions of the first speech recognizer being distinctive of the particular application, as explicitly set forth in claim 1. In this regard, Applicants submit that it is not inherent that an HMM includes a set of pdfs associated with the set of states in the HMM, as suggested by the Examiner (present Office Action; page 3, paragraph 3). Moreover, it is not inherent that HMMs include a set of pdfs corresponding to a second speech recognizer that are generated from a subset of pdfs associated with a first speech recognizer, as required by the subject claims.

With regard to the Examiner's contention that it is inherent that HMMs include a set of pdfs corresponding to a second speech recognizer that are generated from a subset of pdfs associated with a first speech recognizer, Applicants further respectfully traverse the Examiner's taking of Official Notice (present Office Action; page 4, first paragraph) and requests that the Examiner cite a specific

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reference(s) in support of his position, in accordance with MPEP §2144.03. Applicants assert that the facts upon which the Examiner's taking of Official Notice is based are not facts which "are capable of such instant and unquestionable demonstration as to defy dispute." *In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970). "Assertions of technical facts in areas of esoteric technology must always be supported by citation to some reference work recognized as standard in the pertinent art . . ." *Id.* When "general knowledge" is used "to negate patentability, that knowledge must be articulated and placed on the record." *In re Sang-Su Lee*, 277 F.3d 1338, 1345 (Fed. Cir. 2002).

In this regard, the Examiner asserts that "pdfs are inherently associated with states of the HMMs, thus when generating and selecting a subset of states, an associated subset of pdfs can be also generated and selected for the HMM based recognition system" (Present Office Action; page 4, first paragraph). Applicants respectfully disagree with this assertion. Here, the Examiner appears to employ the teachings of the present invention against the inventor in order to arrive at a determination of obviousness. It is well established that "[i]t is impermissible to use the claimed invention as an instruction manual or 'template' to piece together teachings of the prior art so that the claimed invention is rendered obvious." *In re Fritch*, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992).

For at least the above reasons, Applicants respectfully submit that claims 1, 10 and 19 are patentable over the Knittle reference. Accordingly, favorable reconsideration and allowance of these claims are respectfully solicited.

With regard to claims 2-4, which depend from claim 1, claims 11-13, which depend from claim 10, and claim 20, which depends from claim 19, Applicants assert that these claims are also patentable over the prior art of record by virtue of their dependency from their respective claims, which are believed to be patentable for at least the reasons given above. Moreover, one or more of these claims define additional patentable subject matter in their own right. For example, claim 2, as well as claims 11 and 20 which are of similar scope, further define the invention as including the step of "generating acoustic model parameters of the second speech recognizer by reestimating acoustic model parameters of the first speech recognizer based on the set of states of the second

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speech recognizer and the set of probability density functions of the second speech recognizer." This additional feature is not taught or suggested by the prior art of record.

With regard to claim 2, the Examiner contends that the acoustic model parameter set forth in claim 2 is analogous to turning on active states "by setting an appropriate variable . . . in the structure of the [sic] each word tree state (present Office Action; page 4, last paragraph). Applicants assert that the word tree state taught by Knittle (Knittle; column 5, lines 59-61) cannot reasonably be analogized to the acoustic model recited in claim 2, and that the "appropriate variable" which turns on active states in the structure of each word tree state recited in Knittle is not reasonably analogous to an acoustic model parameter, as set forth in claim 2. Furthermore, Applicants submit that the "well-known pruning" cannot reasonably be analogized, as suggested by the Examiner (present Office Action; page 4, last paragraph), to the step of reestimating acoustic model parameters of the first speech recognizer based on the set of states of the second speech recognizer, as expressly required by claim 2.

Reestimating is not synonymous to pruning, as the Examiner suggests. Instead, reestimation is a separate and distinct function that can be performed to improve the recognition accuracy caused by pruning, since pruning typically creates a coarser approximation of the feature space for a given class (present specification; page 13, lines 1-4). Furthermore, although reestimation techniques may be known, claim 2 requires reestimation of acoustic model parameters to be based on the set of states of the second speech recognizer and on the set of pdfs of the second speech recognizer, which is clearly not taught or suggested by the prior art of record.

Accordingly, Applicants submit that claims 2-4, 11-13 and 20 are patentable over the prior art of record, not merely by virtue of their dependency from their respective claims, but also in their own right. Therefore, favorable reconsideration and allowance of these claims are respectfully requested.

Claims 5-9, 14-18 and 21-23 stand rejected under §103(a) as being unpatentable over Knittle in view of "well known prior art," and further in view of Applebaum, either alone or in combination with Sejnoha, as set forth above. Without characterizing the Applebaum reference, Applicants submit herewith an affidavit under 37 C.F.R. §1.131. The affidavit is signed by all inventors named
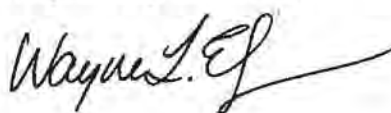
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on the present application. The affidavit and the exhibits attached thereto evidence the conception of an invention falling within independent claims 1, 10, 19 and 21-23 at least as early as March 29, 1999, and thus prior to the April 20, 1999 filing date of the Applebaum reference. The affidavit further evidences an actual reduction to practice of the invention prior to the filing date of the Applebaum reference. Applicants are therefore entitled to overcome the §103(a) rejections of the subject claims using an affidavit under 37 C.F.R. §1.131, in accordance with MPEP §715. Accordingly, favorable reconsideration and allowance of claims 5-9, 14-18 and 21-23 are respectfully requested.

Claims 8 and 17 stand rejected under §103(a) as being unpatentable over Knittle in view of "well known prior art," and further in view of Sejnoha. With regard to claim 8, which depends from claim 1, and claim 17, which depends from claim 10, Applicants assert that these claims are also patentable over the prior art of record by virtue of their dependency from their respective claims, which are believed to be patentable for at least the reasons given above. Moreover, one or more of these claims define additional patentable subject matter in their own right. Accordingly, favorable reconsideration and allowance of claims 8 and 17 are respectfully requested.

In view of the above, Applicants believe that claims 1-23 are in condition for allowance, and respectfully request withdrawal of the §103(a) rejections.

Respectfully submitted,

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Date: December 24, 2003

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Enclosure(s): Affidavit Under 37 C.F.R. §1.131 (w/ exhibits)